

**Project title:** Cost and benefit analysis of the use of seed treatments and timing of planting against aphids in winter wheat and tactics for sustainable management of wheat stem sawfly in South Dakota.

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Total project period: 7/1/16 – 6/30/17

Report type: Annual progress report

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### **Research Summary:**

The purpose of this research is to determine the impact that insecticide seed treatments have on aphid populations in winter wheat, and whether they are capable of reducing the spread and occurrence of *Barley yellow dwarf virus*. An additional goal of this research, was to determine if oats could be used to attract wheat stem sawflies and reduce the infestation of spring wheat in Northwestern South Dakota. This research is on-going.

### **Introduction:**

The goals of this research are to determine whether insecticide seed treatments in winter wheat provide meaningful management of aphid populations during the fall. One of the issues that has been observed is that although aphid populations may or may not be observed in the field, *Barley yellow dwarf virus* is observed during the following spring. This indicates that transmission of the virus most likely occurred during the fall months. However, aphid management in winter wheat is limited to foliar insecticides and seed applied insecticides. Foliar insecticide use is guided by thresholds that reduce the impact that an aphid population will have on yield due to its feeding. These thresholds do not take into account the possibility of the transmission of a virus. However, insecticide seed treatments are active in the plant at emergence, and may provide effective reduction in aphid populations and reduce the spread of *Barley yellow dwarf virus*. The issue is that there has not been research conducted to confirm or deny their effectiveness in South Dakota. In addition, there is more than one type of insecticide seed treatment available and they may or may not be equally effective. The objective of this research is to determine management recommendations for the use of insecticide seed treatments in winter wheat that will maximize yield and reduce the occurrence of *Barley yellow dwarf virus*.

An additional objective of this research is to determine if oats can be planted as a border crop around winter wheat to reduce the infestation of wheat stem sawfly. Wheat stem sawflies are more successful in hollow wheat varieties compared to solid stem varieties. However, they have been observed to show preferential behavior to oats over

wheat. Previous studies have also observed that wheat stem sawfly injury can be reduced by mixing hollow and solid stem wheat varieties.

### **Methods:**

Spring wheat was planted in a collaborator field near Bison, SD. For this study there were two fields. The first field was bordered by Forefront HRS spring wheat, which has hollow stems. The second field was bordered by the Horsepower oats variety. Within each field there were three treatments that consisted of 1) 100% Mott spring wheat (solid stem variety), 2) 100% Forefront HRS (hollow stem variety), or 3) 50% Mott: 50% Forefront. Each treatment was replicated in 10 blocks within the field. Plots were 5'x30'. The spring wheat trial was planted on April 13, 2016. 20 stems from each plot were to be removed from the field and analyzed for the presence of wheat stem sawfly larvae. However, due to an herbicide drift issue from neighboring sunflower plots were not sampled due to limited availability of plants. The project was harvested in July, and we are waiting to receive harvest data. Wheat straw was collected after harvest to be analyzed for the presence of wheat stem sawfly larvae.

Winter wheat will be planted during September and October in Volga, SD for the seed treatment experiment. For this study there will be two planting dates to represent early and late planting. The winter wheat variety Oahe will be used for all treatments. This experiment will consist of six treatments: 1) untreated control, 2) Gaucho 600, 3) Gaucho 600 + Raxil Pro MD, 4) Cruiser 5FS, 5) CruiserMaxx Cereals, 6) Warrior II foliar insecticide. Each treatment will be replicated in 20 blocks. Aphid counts in each plot will be conducted on a weekly basis during the fall after emergence. *Barley yellow dwarf virus* incidence will be scouted during the spring of 2017. Harvest data will be collected during 2017.

### **Description of Accomplishments:**

#### *Spring wheat wheat stem sawfly objective:*

During 2016 wheat and oats were purchased for the project. The project was planted near Bison, SD. Yield data were collected, but are yet to be analyzed.

#### *Winter wheat insecticide seed treatment objective:*

Space at the Volga Research Farm was reserved for the winter wheat research. Wheat was purchased for the project. Seed treatment chemicals were obtained from Bayer CropSciences and Syngenta. Wheat was treated with the seed treatments during September. The field at Volga has been prepared, and will be planted when the weather permits.

### **Projections:**

Based on the current status of the experiments the seed treatment experiment should produce valuable data after its completion next summer. However, due to complications with herbicide drift the wheat stem sawfly research may not produce substantial results.

### **Publications/Data:**

**Varenhorst, A.,** P. Wagner, and A. Bachmann. 2016. Scouting winter wheat for aphid pests. iGrow, South Dakota State University Extension. 9/15/2016.

<http://igrow.org/agronomy/wheat/scouting-winter-wheat-for-aphid-pests/>

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